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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,805	04/05/2005	Alfred Ramirez	HSE-060US	1023

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EXAMINER	
MAYES, MELVIN C	

ART UNIT	PAPER NUMBER
1734	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,805	RAMIREZ ET AL.	
	Examiner	Art Unit	
	Melvin Curtis Mayes	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20 and 22-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20 and 22-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

(1)

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

(2)

Claims 7, 8, 11, 12, 19, 20 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 7 and 8 recite the limitation "the sintered structure." There is insufficient antecedent basis for this limitation in the claim. Claim 1 now claims "the interconnector component."

Claim 11 and 12 recite the limitation "the interconnector plate." There is insufficient antecedent basis for this limitation in the claim. Claim 9 now claims an interconnector "component."

Claim 19 recites the limitation "the sintered structure." There is insufficient antecedent basis for this limitation in the claim. Claim 13 now claims "the interconnector component."

Claim 27 recites the limitation "the interconnector component" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102 and 103

(3)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(4)

Claims 1, 2, 4, 6, 13-17, 23 and 25-27 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Minh et al. 5,290,642.

Minh et al. 5,290,642 discloses a method of making a solid oxide fuel cell core (electrochemical converter) which includes an interconnect (interconnector component or plate) comprising: casting a tape from a slurry of lanthanum chromite powder for the interconnect (first tape or sheet); casting a tape from a slurry of zirconia powder for an electrolyte (second tape); laminating the tapes with cathode and anode tapes; cutting the tapes into laminates; sintering to partially densify; laminating the sintered and densified components to form a stacked assembly; and heat treating to sinter and fully densify the assembly using a compressive force (pressure) during sintering and densifying (thus hot pressing) to promote contact and interbonding, the heat treating to sinter and densify being at temperature of 1000-1400°C. The interconnect layers are thin (0.002-0.005 cm) (0.0008-0.002 inches) (thus interconnector component with thickness less than about 0.03 inches as claimed in Claim 27). The tape for the interconnect is planar (flat) while other tapes are corrugated (col. 6-8).

(5)

Claims 1, 4, 5, 13-17, 23 and 25-27 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Minh et al. 5,256,499.

Minh et al. 5,256,499 discloses a method of making a solid oxide fuel cell core (electrochemical converter) which includes an interconnect (interconnector component or plate) comprising: casting a tape from a slurry of lanthanum chromite powder for an interconnect (first tape or sheet); casting a tape from a slurry of zirconia powder for an electrolyte (second tape); cutting and pressing the tapes into the desired shaped elements; laminating the elements; sintering to partially densify; laminating the sintered and densified components to form a stacked assembly; and heat treating to sinter and fully densify the assembly using a compressive force (pressure) during sintering and densifying (thus hot pressing) to promote contact and interbonding, the heat treating to sinter and densify being at temperature of 1000-1400°C. The interconnect and electrolyte layers are thin (0.002-0.005 cm) (thus interconnector component with thickness less than about 0.03 inches as claimed in Claim 27). The tape for the interconnect is planar (flat) while other tapes are corrugated (col. 5-8).

(6)

Claims 23, 25 and 26 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over JP 5-101838.

JP 5-101838 discloses an interconnector (interconnector plate) for a solid electrolyte fuel cell made by forming a thin film of lanthanum chromate by tape-casting; sintering the thin film to a density of 95% or more of theoretical density; and heating the sintered thin film under weight of a flat plate (heat and pressure after sintering) to flatten the thin film (Abstract and

computer translation).

In the event any differences can be shown for the product of the product-by-process claims 23, 25 and 26, as opposed to the product taught by the reference JP 5-101838, such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results; see also In re Thorpe, 227 USPQ 964 (CAFC 1985).

When the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product claimed in a product-by-process claim, a rejection based alternatively on either section 102 or 103 of the statute is appropriate. As a practical matter, the Patent and Trademark Office is not equipped to manufacture products by the myriad of processes put before it and then obtain prior art products and make physical comparisons therewith. A lesser burden of proof is required to make out a case of prima facie obviousness for product-by-process claims because of their particular nature than when a product is claimed in the conventional fashion. *In re Brown*, 59 CCPA 1063, 173 USPQ 685 (1972); *In re Fessmann*, 180 USPQ 324 (CCPA 1974).

(7)

Claims 2, 3, 18 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minh et al. 5,290,642 as applied to claims 1, 13 and 23, and further in view of Simpkins et al. 2002/0081475.

Simpkins et al. 2002/0081475 teaches that in a solid oxide fuel cell, the interconnects can comprise materials such chromium and lanthanum chromite as well as alloys and combinations of the materials [0034].

It would have been obvious to one of ordinary skill in the art to have modified the method of Minh et al. by forming the tape for the interconnect from a combination of lanthanum chromite powder and chromium powder or chromium alloy, as taught by Simpkins et al, as an alternative to lanthanum chromite for an interconnect for a fuel cell. The use of chromium or chromium alloy and lanthanum chromite in combination for making the interconnect would have been obvious to one of ordinary skill in the art as an alternative to just lanthanum chromite, as taught by Simpkins et al., and thus the slurry for the interconnect comprises a powder or material comprising at least 95% chromium, as claimed.

(8)

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minh et al. 5,290,642 as applied to claim 1, and further in view of Olsen et al. 2004/0017028.

Olsen et al. teach that in making a solid oxide fuel cell by assembling and sintering layers, narrow tolerance with maximum tolerance of 1% can be achieved by shaping the fuel cell after sintering using various cutting tools [0005]-[0010].

It would have been obvious to one of ordinary skill in the art to have modified the method of Minh et al. by also shaping the solid oxide fuel cell core after heat treating to sinter and fully densify, as taught by Olsen et al., to achieve a solid oxide fuel cell of narrow tolerance with maximum tolerance of 1%.

Olsen et al. has a filing date of 5/12/2003. Provisional application No 60/403,218 filed 8/13/2002 from which the present application has priority does not support a claim directed to trimming the sintered structure.

(9)

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minh et al. 5,290,642 as applied to claim 13, and further in view of Kotchick et al. 4,913,982.

Kotchick et al. 4,913,982 teach that in making a solid oxide fuel cell core by laminating and sintering tapes, the interconnect and electrolyte material undergo densification to 94-99% of theoretical density, thereby forming a gas tight barrier (col. 10, lines 4-7).

It would have been obvious to one of ordinary skill in the art to have sintered and fully densified the lanthanum chromite interconnect of the assembly of Minh et al. to a density of 94-99% of theoretical density, encompassing at least 96%, as taught by Kotchick et al., to form a gas tight barrier.

(10)

Claims 1, 8, 13, 15, 16, 19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over McPheeters et al. 5,882,809 in view of Minh et al. 5,290,642.

McPheeters et al. disclose a method of making a solid oxide fuel cell (electrochemical converter) which includes an interconnect (interconnector component or plate) comprising: providing a C/I/A (cathode layer/interconnect layer/anode layer) composite sheet by tape casting; forming a single cell unit comprising the C/I/A composite sheet; sintering at high temperature to fuse the component materials together into a finished subassembly; and painting or spraying a conductive material on either or both end surfaces of the single cell unit (coating the sintered structure with a compound) (col. 4-7). McPheeters does not disclose applying pressure during sintering (hot pressing).

Minh et al. teach that in making a solid oxide fuel cell by laminating and sintering tapes,

compressive force is applied to promote contact and interbonding at the adjacent surfaces (col. 8, lines 41-42).

It would have been obvious to one of ordinary skill in the art to have modified the method of McPheeters et al. by sintering the laminated tape-cast sheets by applying pressure during sintering, as taught by Minh et al., to promote contact and interbonding at the adjacent surfaces.

(11)

Claims 1 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over McPheeters et al. 5,882,809 in view of Kwon et al. 2005/0019636.

McPheeters et al. disclose a method of making a solid oxide fuel cell (electrochemical converter) which includes an interconnect (interconnector component or plate) comprising: providing a C/I/A (cathode layer/interconnect layer/anode layer) composite sheet by tape casting; forming a single cell unit comprising the C/I/A composite sheet; sintering at high temperature to fuse the component materials together into a finished subassembly; and painting or spraying a conductive material on either or both end surfaces of the single cell unit (coating the sintered structure with a compound) (col. 4-7). McPheeters does not disclose applying pressure during sintering (hot pressing).

Kwon et al. teach that in making a solid oxide fuel cell by sintering tape-cast layers, pressure-sintering such as hot pressing is preferred over pressureless sintering [0035].

It would have been obvious to one of ordinary skill in the art to have modified the method of McPheeters et al. by sintering the laminated tape-cast sheets by applying pressure during sintering (hot pressing), as taught by Known et al, as preferred over pressureless

sintering. Claims 1 and 8 only have priority to PCT/US03/25517 filed 8/13/2003. Applicant's Provisional application 60/403,218 filed 8/13/2002 does not support the rejected claims.

(12)

Claims 9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minh et al. 5,290,642 in view of JP 9-190829.

Minh et al. 5,290,642 discloses a method of making a solid oxide fuel cell core (component of an electrochemical converter) comprising: casting a tape from a slurry of lanthanum chromite powder for an interconnect; casting a tape from a slurry of zirconia powder for an electrolyte; laminating the tapes with cathode and anode tapes; cutting the tapes into laminates; sintering to partially densify; laminating the sintered and densified components to form a stacked assembly; and heat treating to sinter and fully densify the assembly using a compressive force during sintering and densifying to promote contact and interbonding, the heat treating to sinter and densify being at temperature of 1000-1400°C. The tape for the interconnect is planar (flat) while other tapes are corrugated (col. 6-8). Minh et al. do not disclose providing the interconnect as a combination of lanthanum chromite layer and chromium layer.

JP 9-190829 teaches that a lanthanum chromite separator of a fuel cell is provided with a metal material layer such as chromium such as by sticking a metallic foil to provide the lanthanum chromite with stability in reducing atmosphere.

It would have been obvious to one of ordinary skill in the art to have modified the method of Minh et al. for making a fuel cell core by laminating a chromium foil to the lanthanum chromite tape, as taught by JP 9-190829, to provide the lanthanum chromite

interconnect with stability in reducing atmosphere. By laminating a metallic chromium foil to the lanthanum chromite tape and heating treating the assembly to form the fuel cell, an interconnect comprising a first layer of at least 95% chromium and a second layer of lanthanum chromite formed by laminating and hot pressing is obviously formed.

(13)

Claims 1, 2, 4, 9-11, 13, 15, 16, 22, 23, 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cable 2003/0077498 in view of Minh et al. 5,290,642.

Cable discloses a method of making a multi-layer interconnect comprising: providing ceramic sheets of ceramic such as lanthanum chromite (first and second tapes); providing a bonding layer on the outer surface and comprising materials used for the fuel-side vias such as chromium (first layer comprising chromium); and co-firing. The ceramic sheets are made by tape casting and the interconnect is tape cast to a thickness between 0.3 and 0.7 mm (0.01-0.03 inches) or altered according to the relative electrical and physical properties of the desired interconnect/fuel cell stack [0038, [0042], [0050], [0057-[0058], [0066]. Cable does not disclose applying pressure during co-firing (hot pressing).

Minh et al. teach that in making a solid oxide fuel cell by laminating and sintering tapes, compressive force is applied to promote contact and interbonding at the adjacent surfaces (col. 8, lines 41-42).

It would have been obvious to one of ordinary skill in the art to have modified the method of Cable for making a multi-layer interconnect by co-firing (sintering) the laminated tape-cast sheets by applying pressure during sintering, as taught by Minh et al., to promote contact and interbonding at the adjacent surfaces of the sheets.

(14)

Claims 13-16, 19, 20, 22, 23 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maricle et al. 4,857,420 in view of Minh et al. 5,290,642.

Maricle et al. disclose a method of making a separator (interconnector) plate for a fuel cell stack comprising: providing a web portion made from green Mg doped lanthanum chromite sheet cut to size and laying seal flanges for from strip of the same green sheet material on the edges of the cut sheet to obtain the desired thickness; sintering the green composite member to a density if 94%-96% of theoretical density; and forming a plate of nickel oxide zirconia anode electrode material on the separator plate by plasma spraying after sintering. The separator plate has a thickness of 2-10 mils (0.002-0.01 inches) (overlapping the range of about 0.01-0.03 inches as claimed in Claim 22 and encompassed by less than 0.03 inches as claimed in Claim 27) (col. 3, lines 34-59, col. 5, line 22). Maricle et al. do not disclose applying pressure during sintering of the interconnector plate (hot pressing).

Minh et al. teach that in making a solid oxide fuel cell by laminating and sintering tapes, compressive force is applied to promote contact and interbonding at the adjacent surfaces (col. 8, lines 41-42).

It would have been obvious to one of ordinary skill in the art to have modified the method of Maricle et al. for making an interconnector plate for a fuel cell stack by sintering the laminated sheets by applying pressure during sintering, as taught by Minh et al., to promote contact and interbonding at the adjacent surfaces of the composite member of laminated green sheets. Forming the green sheet by casting Mg doped lanthanum chromite powder would have

been obvious to one of ordinary skill in the art of ceramic processing as a well known method of making green sheet material.

Response to Arguments

(15)

Applicant's arguments filed June 25, 2007 have been fully considered but they are not persuasive.

Applicant argues that Minh et al. '642 discloses heat processing using only heat, not heat and pressure.

Minh et al. '642 discloses applying a compressive force during heat treating for sintering in order to promote contact and interbonding at adjacent surfaces (col. 8, lines 39-43). Minh et al. thus disclose using a combination of heat and pressure to form an interconnector component or plate.

Applicant argues that Minh et al. '499 discloses heat processing using only heat, not heat and pressure.

Minh et al. '499 discloses applying a compressive force during heat treating for sintering in order to promote contact and interbonding at adjacent surfaces (col. 8, lines 37-41). Minh et al. thus disclose using a combination of heat and pressure.

Applicant argues that JP 5-101838 discloses sintering then flattening by applying weight but does not disclose applying both heat and pressure to sinter.

With respect to JP 5-101838 and Claims 23, 25 and 26, the claims are product-by-process claims. JP '838 discloses a product which reasonably appears to be either identical with or only

slightly different than a product claimed in a product-by-process claim, although made by a different method.

Applicant argues that neither Simpkins, Olsen nor Kotchick teach hot pressing using a combination of heat and pressure to form the sintered structure.

It is Minh et al. '642 upon which the rejections are based that discloses applying a compressive force during heat treating for sintering in order to promote contact and interbonding at adjacent surfaces (col. 8, lines 39-43). Minh et al. thus disclose using a combination of heat and pressure to form an interconnector component or plate.

Applicant argues that McPheeters, Minh et al. '642 and Kwon do not teach hot pressing using heat and pressure.

Minh et al. '642 teaches applying a compressive force during heat treating for sintering in order to promote contact and interbonding at adjacent surfaces (col. 8, lines 39-43). Thus it would have been obvious to one of ordinary skill in the art to have applied compressive force (pressure) during sintering of the single cell unit of McPheeters which includes an interconnector component. Kwon et al. also teach that in making a solid oxide fuel cell by sintering tape-cast layers, pressure-sintering such as hot pressing is preferred over pressureless sintering. Kwon et al. qualifies as prior art for the rejected claims because Kwon et al. has priority to Provisional application filed 6/9/2003 while the rejected claims only have priority to PCT/US03/25517 filed 8/13/2003. Applicant's Provisional application 60/403,218 filed 8/13/2002 does not support the rejected claims.

Applicant argues that Minh et al. '642 and JP 9-190829 does not teach an interconnector including a layer of composition that is at least 95% chromium.

JP 9-190829 teaches that it is known to provide a lanthanum chromite separator of a fuel cell with a metal material layer such as chromium such as by sticking a metallic foil to provide the lanthanum chromite with stability in reducing atmosphere. The Examiner maintains the position that it would have been obvious to one of ordinary skill in the art to have modified the method of Minh et al. for making a fuel cell core by laminating a chromium foil to the lanthanum chromite tape, as taught by JP 9-190829, to provide the lanthanum chromite interconnect with stability in reducing atmosphere, thus obviously forming an interconnect comprising a first layer of at least 95% chromium and a second layer of lanthanum chromite, as claimed.

Conclusion

(16)

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Phillip C. Tucker can be reached on 571-272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM
September 4, 2007